5th Grade

Unit 3

Standards, Rationale, Strategies, and Misconceptions

Adapted from Progressions from Tools for the Common Core Standards

5.NBT.2

Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

5.NBT.7

Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Rationale

Continue to focus on the structure of what is occurring with the base 10 number system and the patterns for decimals. In this unit students will be relating their understanding of the operations of whole numbers and fractions to their work with operations and using decimals. Students will build on the decimal work that was done in fourth grade.

There is uniformity in the structure of the base-ten number system therefore students will use the same place value understanding for adding and subtracting decimals as they did for adding and subtracting whole numbers. Students need to attend to aligning the corresponding places correctly for decimal numbers (this also aligns the decimal point).
Use of standard algorithms (decimal computation and long division is not mastered until 6th grade) Go to this link on the NBT K-5 progressions.

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Strategies

1. When introducing decimal operations, start with problem types so students can make sense of the numbers in a context that groups in tens. Also, as students work with the numbers, encourage them to connect what they are doing with their understanding of fractions, specifically tenths and hundredths.

2. Focus on the concept and pattern of what is happening (the pattern) to decimal numbers when you add, subtract, multiply, and divide. Look at the structure. Have students compare what happens with decimal numbers to whole numbers. Make sure students understand by requiring them to explain what is the same and different. *Learning a procedure without understanding is a common reason for students to struggle with math.*

3. Use problem-types to help students make sense of decimal computation. For example:
   Juan is making awards using ribbon for all the kindergarten classes in a school. He has 10 meters of ribbon. It takes .1 meters of ribbon for each certificate. How many certificates can Juan make with his ribbon?

4. Compose and decompose decimal numbers. For example: 0.23 can be .1 + .1 + .03 or .20 and .01 + .01 + .01.

5. Play "All the ways to express a number" example: Express the number 0.23 as .24 - .01 or .023 x 10 or .1 + .13. This can be a warm-up or opening to a lesson.

6. Use the "number talk" portion of your instruction to compare and estimate decimal numbers. Look at the structure.

7. Have tools available as needed on the SMARTboard so that students can explain their thinking using virtual base 10 blocks, grids, meter stick or various number lines.

Misconceptions

- The longer the number the greater the number
  With whole numbers, a 5-digit number is always greater than a 1-, 2-, 3-, or 4-digit number. However, with decimals a number with one decimal place may be greater than a number with two or three decimal places. For example, 0.5 is greater than 0.12, 0.009 or 0.499. One method for comparing decimals it to make all number have the same number of digits to the right of the decimal point by adding zeros to the number, such as 0.500, 0.120, 0.009 and 0.499. A second method is to use a place-value chart to place the numerals for comparison.

- Putting a zero at the end of a decimal number makes it ten times as large

- Decimal fractions are "below zero," or negative numbers

- Place value columns include "oneths" to the right of the decimal point

- One-hundredth is written 0.100

- One-fourth can be written either as 0.4 or as 0.25

- When you do something to one side of the dot, you also do it to the other side (e.g., 2.5 + 1 = 3.6)